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## PATENT SPECIFICATION

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## (54) AUTOMATIC MARKETING SYSTEM

(71) We, FMC CORPORATION, a corporation organized and existing under the laws of the State of Delaware, United States of America, of 1105 Colenau Avenue, San Jose, California, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to an automatic marketing system and method for self-service stores wherein customers have free access to handle, inspect and remove merchandise.

According to the present invention, there is provided an automatic marketing system comprising a plurality of means for supporting articles of merchandise in self-service sales display positions, weight-sensing means connected to each of said article-support means for translating changes in weight on said article-support means into electrical signals, detecting means associated with said weight-sensing means for receiving customer-identification means and for sensing indicia thereon to identify customers at the time articles are placed on or removed from the associated article-support means, and data-processing equipment connected with said weight-sensing means and said detecting means for recording weight changes produced by article placement or removal by an identified customer and tabulating these data into an invoice.

Further according to the present invention there is provided a method of marketing merchandise comprising the steps of displaying like articles for sale in groups acting upon weight-sensitive electric transducers, identifying each customer selecting articles from each group by means bearing indicia, rapidly sensing the reading in sequential order of each weight-sensitive electric transducer and any customer identification means associated therewith, comparing readings received on a current

sensing sequence with readings received on a prior sensing sequence to determine the number of articles removed from each group and the identification of customers removing the articles, storing data of articles removed by each identified customer in the memory of a computer, storing price information relative to articles of each group in the memory of the computers, calculating charges for the number of articles removed from each group and the total charge for all articles removed by each identified customer, and printing each customer's invoice in accordance with output data from the computer.

The invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, in which:

Figure 1 is a block diagram of an automatic marketing system in accordance with the invention;

Figure 2 is a perspective view of a self-service store embodying the system shown in Figure 1;

Figure 3 is a perspective view of a store fixture modified in accordance with the present invention;

Figure 4 is a section taken on the line 4—4 of Figure 3;

Figure 5 is a section taken on the line 5—5 of Figure 3;

Figure 6 is a side elevation view of a bottle rack holder;

Figure 7 is a side elevation view of a bag holder;

Figure 8 is a front elevation view of an elongate article hanger;

Figure 9 is a sectional view of a freezer unit, taken on line 9—9 of Fig. 2;

Figure 10 is a section taken on line 10—10 of Fig. 9; and

Figure 11 is a section through a modified form of display scale which utilizes load cells.

Looking now at Figure 2, a store 10 is

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shown wherein an automatic marketing system in accordance with the present invention has been installed. An entrance door 12 and an exit door 14 are provided at one end of the store and a passageway 16 leads from the entrance door to a check-in card dispenser 18. This dispenser issues a rectangular plastic card, about 2" by 3" in size, to each customer entering the store, and each card bears indicia to identify the customer. Such indicia could be in the form of either holes punched in the cards or permanent magnets imbedded therein which would have a unique characteristic upon scanning. Built within the card dispenser is a card reader which reads each card as it is dispensed and transfers the information to a mini-computer which will be described hereinafter.

Positioned alongside the check-in card dispenser 18 are a check-out card reclaimer 20 and printing terminals 22 of data processing equipment. The card reclaimer receives the shopper's identification card upon completion of shopping and a card reader in the reclaimer 25 reads the card and notifies the data processing equipment that the card has been returned. A complete invoice of all the purchases made by the shopper is prepared by the data processing equipment and typed out by the printing terminals. Behind the card dispenser and reclaimer is a cashier's chair 24 in which a cashier may be seated. An exit passage 25 extends alongside of the card reclaimer and the cashier's chair but is separated by a divider rail from passageway 16.

Spaced inward along entrance passage 16 from the card dispenser 18 is a series of bottle rack holders 26 where customers can return empty bottles and receive credit for them. On the opposite side of the passage from the bottle rack holders is a line of shopping carts 28 that customers use for carrying articles selected in self-service fashion within the market.

Market display fixtures include meat display cases 30, 31 and 32 that extend rearwardly along one side of the market. Refrigerated shelves 33 and 34, used for dairy products and beverages, are positioned at the back of the market along with cooler shelves 35 and 36 that contain produce, as does counter 37. Among the interior fixtures are refrigerator cases 38, 39 and 40 that contain frozen foods, while shelving fixtures 41, 42 and 43 hold can goods and packaged articles. Dispensing stands 44, 45, 46, 47, 48 and 49 are provided for dispensing large bulk articles such as sacks of flour, fertilizer and pet food.

The general appearance of these store fixtures which display merchandise in accordance with this automatic marketing system is nearly the same as those currently used in supermarkets. Among the noticeable differences are the rows of shelving, divided into short segments of from three to four feet by shelf dividers,

and a card reader located adjacent each segmented bank of shelves.

A typical shelf display stand 50, shown in Fig. 3, includes a base 51 that supports a column member 52 and a base 53 that supports a column member 54. A panel 55 extends between the column members to form an integral structure. The column members are slotted at various elevations to receive brackets 56a and 56b (Fig. 5) and these brackets are joined together by transverse stiffeners 57a, 57b and 57c, as shown in Figure 5. The brackets and transverse stiffeners support shelving 58 that extends between the brackets, as shown in Figure 4. This portion of the shelf display stand is conventional store fixture equipment.

Mounted on the shelving 58 are display-scales 59 and 71 (Fig. 3 & 4) that distinguish the shelf display stand from conventional store fixtures. These display-scales support articles of merchandise in self-service; sales-display positions and translate weight changes of the articles supported into changes in voltage in an electrical circuit which will later be described.

Display scale 59 includes a platform 60 having downwardly turned side edges 61, 62, 63 and 64, as shown in Figs. 4 and 5. The platform is braced transversely between side edges 62 and 64 by channel-shaped stiffeners 65 and 66. A cantilever beam 67 is fastened to the lower portion of the stiffener 65 adjacent side edge 62 and projects outwardly towards the corner of the platform. This cantilever beam is made of resilient metal, and a cap 68 is fastened to the outer end thereof. The cap bears upon a half-spherical button 69, which is fixed to the shelving 58, and the cap is indented to fit around the outer side of the button but relieved inwardly thereof to allow for movement when the cantilever beam deflects. Similar cantilever beam supports are provided at the other three corners of the platform, said beams being connected respectively to the opposite end of stiffener 65 and to each end of stiffener 66. A strain gauge 70 is attached to the upper surface of cantilever beam 67, and similar strain gauges are attached to the other cantilever beams. These strain gauges are connected in an electrical bridge circuit so that weight changes on the platform can be determined by the four strain gauges which measure the deflection in the cantilever beams. Such strain gauges are standard commercial items that can be obtained from BLH Electronics, Inc. of Waltham, Massachusetts, United States of America.

It should be noted that the side edge 63, shown in Fig. 4, is spaced above the upper surface of shelving 58 by a distance G, when the platform 60 is in an unloaded condition. The distance G is equivalent to a deflection within the elastic limit of each cantilever beam and thus, should the platform become over-

loaded, the side edges will contact the shelving before the cantilever beams are permanently deformed.

Displayer scale 71 is positioned beside displayer scale 59 on shelving 58 and is of different construction than scale 59. A platform 72 having downwardly turned side edges is supported intermediate the side edges by a single channel-shaped stiffener 73, and cantilever beams 74 and 75 are secured to and project outwardly in opposite directions from one end of the stiffener towards the rear corners of the platform. The outermost end of beam 74 is bent to form a notch 76 which rests upon an upper knife edge of a rocker 77. The bottom surface of the rocker is rounded to provide for rocking movement and a pin projecting from the rocker fits through an opening in the shelving to prevent the rocker from travelling with the rocking movement. A notch 78 is formed in the outermost end of beam 75 and receives the knife edge of a rocker 79 that is pivotal coupled to the shelving. A strain gauge 80 is attached to cantilever beam 74 and a strain gauge 81 is attached to cantilever beam 75. Similar cantilever beams, rockers and strain gauges are provided at the forward end of stiffener 73 so that the displayer scale has a four point support, and the rockers enable a substantial deflection of the cantilever beams without changing the relative length between the knife edges of the rockers and the location of the strain gauges.

When merchandise is stacked on the displayer scales and two scales are positioned adjacent to each other, as are displayer scales 59 and 71 shown in Fig. 3, there is a tendency for merchandise on one displayer scale to contact merchandise on the other displayer scale or panel 55 and thus, inaccurate weight readings result. To remedy this condition, each displayer scale platform may be enclosed, as shown on the shelf below scale 71, where shelf dividers 82 and 83 shut in the sides and a connecting-panel 84 covers the back.

A card reader 85 is fastened to the undersurface of shelving 58 and includes an alarm 86 and an instruction light 87. This card reader serves all of the displayer scales located on its side of shelf display stand 50, and is adapted to receive a customer identification card 88 having indicia for identifying customers. Should an article be lifted from one of the displayer scales without the insertion of an identification card into the card reader, instruction light 87 will flash a signal requesting the insertion of an identification card and alarm 86 will sound to summon a clerk or attendant.

60 A bottle rack holder 26 is shown in Fig. 6 and consists of conventional shelving that supports a displayer scale 89 on a lower shelf and a displayer scale 90 on an upper shelf. These scales are of either the type illustrated by the displayer scale 59 or by the displayer

scale 71, and further include means for supporting a conventional soft drink bottle case C in an upstanding position on the scale platform. Support 91 extends upright from the rear edge of platform 89, and a clamping member 92 is adjustably fixed to the upper portion of the support and fits about the sides of the bottle case C. Similarly, support 93 extends upright from the back of platform 90 and a clamping member 94 is adjustably fixed to the upper portion of the support and fits about the sides of the bottle case C. Thus, the bottle cases C are supported on the displayer scales in a position for receiving bottles returned by shoppers. A card reader 95 is fixed to the bottle rack holder and associated with the displayer scales to receive the identification cards of shoppers returning bottles so that credit can be given to the shoppers' accounts for bottles returned as indicated by weight increases on the displayer scale.

Since the displayer scales are used for vending a wide variety of articles varying in shape, size, weight and physical characteristics, it is necessary to adapt the scales to accommodate the articles displayed. One such modified form of displayer scale is shown in Fig. 7 for displaying light-weight articles. That portion of the displayer scale including the scale platform is similar to displayer scale 59, previously described. A hook member 96 is fixed to the platform surface and extends in spaced relationship therabove so that packets P can be hung thereon. The strain gauges supporting this displayer scale have an accuracy in measuring weight changes to the nearest 1/8 oz. These strain gauges have a rated accuracy such that they can accurately measure one unit loss or gain within the range of from 0 to 500 units.

Another modification of a displayer scale is shown in Fig. 8 wherein the basic scale portion is similar to displayer scale 59 and support racks 97, 98 and 99 are mounted thereon for holding a mop 100, a squeegee 101, and a broom 102, respectively.

The refrigerator case 40 is shown in Fig. 9 having a support shelf 104 mounted within the case by a plurality of connector rods 105 and 106 that are secured to the shelf and extend into openings in the walls of the case. A basket 107 is supported on the shelf by a four point suspension utilizing cantilever beams and strain gauges in a manner similar to the support of displayer scale 59. Taking one corner as typical of the four supports, a half-spherical button 108 is fastened to the shelf 104 and a cap 109 fits over the button. The cap is fixed to the outermost end of a cantilever beam 110, that extends inward from the cap at one corner of the basket to an intermediate support 111, which is fixed to the bottom of the basket. A strain gauge 112 (Fig. 10) is attached to the surface of the cantilever beam at a fixed distance from the cap for

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measuring deflection in the beam. Similar cantilever beams, supports and strain gauges are provided at the other corners of the basket and the strain gauges are connected in an electrical bridge circuit which determines weight changes in the basket by the deflection of the four cantilever beams. A card reader 112a is fitted in a side edge of the refrigerator case to receive identification cards of shoppers and thereby identify persons taking articles from the case.

Figure 11 illustrates a modified form of display scale 113 suitable for supporting heavy loads in the manner of dispensing stands 44, 15, 45, 46, 47, 48 and 49. This display scale includes a platform 114 having downwardly-turned side edges. The platform is supported longitudinally by a channel 115 and another channel, not shown, and is transversely supported by channels 116 and 117. Channel 116 rests upon a load cell 118 below the intersection with channel 115 and a load cell 119 supports channel 117 below the intersection of that channel with channel 115. Similar load cells are provided at the other two points of channel intersection, not shown, to provide a four point load cell support. These load cells are standard commercial items such as the Baldwin SR-4 load cell manufactured by BLH Electronics, Inc. of Waltham, Massachusetts, United States of America and are connected in an electrical bridge circuit to translate weight changes on the platform into changes in voltage.

A four point support for display scales, using either load cells or cantilever beams and strain gauges, is designed to permit accurate weight readings regardless of the position of articles supported upon the display scale platform. The platform tends to deflect as a unit and the weight readings are determined by the sum of deflections at the four support points so unequal platform loading has little effect upon the accuracy of the weight reading.

Display scale weight sensitivity determines the minimum size of a single article that can be detected by the scale and the maximum load capacity of the scale. Each scale must have a sensitivity adapted to fit the articles of merchandise that it is intended to handle and this sensitivity is determined by the rated accuracy of the strain gauges together with the stiffness characteristics of the cantilever beam supports. Strain gauges having a rated accuracy of one-fifth of one percent can accurately measure one unit gain or loss in deflection anywhere within a range of from 0 to 500 units, while the section modulus of the cantilever beam supports must be of a value that will provide a measurable deflection for each unit of weight throughout that range and a maximum deflection for 500 units of less than the distance G, shown in Fig. 4.

When similar articles of uniform weight are displayed on a scale, the sensitivity of the scale

must be sufficient to determine the number of articles removed. It is not necessary to determine exact weights. Many articles of merchandise come in random weights, such as produce and meat, and in such cases the scales must determine the exact weight of articles removed. By limiting the maximum load on a scale and grouping the articles for substantial weight similarity, satisfactory scale sensitivity can be achieved.

As described conventional store fixtures support display scales that include means for supporting articles of merchandise in sales display positions such as platforms, racks, hooks or baskets and weight-sensing means are connected to the article support means for translating changes in weight on the article support means into voltage changes. These weight sensing means can be strain gauges attached to cantilever beam supports or load cells positioned as compression members beneath the article support means. Load cells could also be used as tension members from which article support means would be suspended. A card reader is associated with the weight-sensing means for receiving customer identification cards and sensing indicia thereon to identify customers relative to changes in weight on the article-support means. Data processing equipment, which will subsequently be described, is connected with the weight-sensing means and the card reader for recording weight changes associated with each customer and tabulating these data into an invoice when the customer completes shopping.

Turning to Figure 1, display scales 120, 121, 122, 123 and 124 are arranged in a bank and associated with a card reader 125. An instruction light 126 is associated with the card reader to signal a shopper to insert an identification card into the card reader and an alarm 127 is associated with the card reader to summon an attendant when articles have been taken from the display scales without the insertion of a shopper's identification card. A bottle rack display scale 90 is associated with a card reader 95 and all of the display scales and card readers are connected with a multiplexer 130.

The term "multiplexer" is used herein to mean a device for combining two or more signals, for example a device which can receive signals from a plurality of lines and combine such signals into a single output signal with different time periods of the single signal corresponding to different scales and card readers. A check-in card dispenser 18 is connected with the multiplexer to indicate when a shopper's identification card is put in use, while a check-out card reclaimer 20 is connected with the multiplexer and indicates when a card is returned from use.

The multiplexer 130 is a component of a combination unit that includes an amplifier 133 and a converter 134. The multiplexer is

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a high speed sensing device that senses the weight indicated on the display scales and associated card readers to command a weight reading report once every second from every scale in the store. Such sensing consists of sending an electrical pulse in sequential order to each display scale and card reader. The pulses are modified by the strain gauges and indicia on the customer identification cards to return analog signals. Analog signals received by the multiplexer are amplified by the amplifier and then changed into digital machine language by the converter. Actual hardware suitable to form the combination unit includes wire-contact relays and group drives as manufactured by International Business Machines Corporation of New York, N.Y., United States of America, hereinafter referred to as IBM; multiplexer switches as manufactured by Digital Equipment Corporation, hereinafter referred to as DEC, and having item designation No. A121; an amplifier for analog input; a multiplex control and analog to digital converter as manufactured by DEC with item designation No. AFO1; a six bit decoder; and a power supply.

A mini-computer 135 receives digital information from the converter 134 and contains in storage the identity numbers of all display scales in the store along with weight report readings of the previous weight sensing operational sequence. The mini-computer compares the weight report readings received on the current weight sensing sequence by subtracting the prior weight readings therefrom. The amount of any net weight change detected, together with the associated shopper's identification card number and order position in the sequence to identify the display scale appear as output from the mini-computer to a store control unit 136. A computer suitable for use as the mini-computer is manufactured by DEC having item No. PDP-8I and should be combined with a memory extension and memory module manufactured by DEC having item designation No. A1C-8I.

Store control unit 136 receives the output from the mini-computer 135 and checks to see that a valid shopper's identification card number is associated with each net weight change on a display scale. If no card number is associated with the net weight change, the store control unit actuates instruction light 126 notifying a shopper to insert an identification card into the card reader 125 and sounds alarm 127 until an identification card has been inserted. A store attendant will be summoned by the alarm if a shopper does not insert an identification card and can insert a special store card to stop the alarm if no shopper is present. Any identification card number associated with a net weight change will be compared with a list of cards in use, the numbers of which are added to the list by the check-in card dispenser 18 and removed therefrom

by the check-out card reclaimer 20. If a card number is detected by the store control unit which is not on the list of cards in use, the card would apparently be a counterfeit and the number of the display scale associated with the card reading is transmitted to a numerical article display directory 137, located at the cashier's stand. The cashier then notifies an attendant to check at the designated display scale.

The store control unit 136 is a computer of a type manufactured by DEC having item designation No. PDP 8-S. This unit is connected with a Data-Phone 138, a trade name for a device manufactured by Bell Systems Inc, that is located at the store and permits transmission of data over leased telephone channels to a second Data-Phone 139, located at a data centre 140. A transmission control 141 is connected with Data-Phone 139 and initiates transmission of information in a data storage buffer of the store control unit by Data-Phone to the data centre. A suitable transmission control is manufactured by IBM having item designation No. 2701.

Information transmitted by Data-Phone to the transmission control 141 is fed to a storage control 142 that can be of a type manufactured by IBM having item designation No. 2841. All weight change readings for identified display scales are filed according to the associated customer identification number in a disk file. The term "disk file" as used herein is intended to mean a rotary disk having a magnetizable surface on which information can be stored as a pattern of polarized spots on concentric recording tracks of said surface. In the event that a weight change has occurred without the insertion of a shopper's identification card, such data is held temporarily in a data buffer file until a shopper's card has been inserted and the identification number received. Then the data is transferred from the buffer and filed by shopper's identification card number. Other components for storage include a disk storage drive 143, as manufactured by IBM having item designation No. 2311, and disk packs 144 manufactured by IBM having item designation No. 1316.

When a customer completes shopping, his identification card is inserted into the check-out card reclaimer 20 and the card number is transmitted to the storage control 142. All data collected for that number is fed from the disk file through a control unit 145 to a central processor 146. The control unit is of a type manufactured by IBM having item designation No. 2821 and the central processor is a computer of a type manufactured by IBM having item designation No. 360/40. This computer at the data centre 140 can be time shared by the store or a group of stores with non-real time data processing programs that would be interrupted momentarily to process a customer's account and then continue on at the

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5	point in the progress where it left off. The term "non-real time data processing programs" is intended to mean herein the performance of a computation subsequent to the time that a related physical process or event occurs where the amount of the time delay between process or event and computation is immaterial.	5	1
10	A printer keyboard 147 enables an operator to feed information through control unit 145 and into central processor 146, while card read or punch 140 enables an operator to read or punch information into punched cards. A suitable printer keyboard is manufactured by IBM having item designation No. 1052 and a card read punch that would be adaptable is manufactured by IBM having item No. 2540. A line printer 149 is connected with the control unit and central processor to print output therefrom at a rapid rate. Such a line printer is manufactured by IBM having item designation No. 1403.	10	1
15	Printing terminals 150 are provided at the store and output from the central processor is transmitted by Data Phone thereto. Such printing terminals include a high speed electric typewriter that prints out invoices at approximately fifteen characters per second, and include a data storage buffer since the printing terminals cannot maintain the pace of data output from the data centre. Printing terminals of the type desired are manufactured by IBM having item designation No. 1053 and a printing terminal control unit, also manufactured by IBM having item designation No. 1051, is adapted to accommodate the printing terminals.	15	1
20	When the central processor 146 computes a customer's account, the first step is to calculate the net weight change per display scale. This is necessary since a customer may pick up and put down several items or may take more than one. Held in memory by disk file is a number corresponding to each display scale along with its associated product selection description and price table listing the charges per units selected. The central processor calculates the charges for weights removed as per programmed instructions or as listed in a look-up table. Data stored by the product selection description file must be periodically updated to reflect new item prices, introduction of new or different products or rearrangement of stock.	20	1
25	The central processor 146 calculates the net weight changes for the display scales, the number of articles taken and the total price. Also, information is provided to calculate cumulative total prices, taxes, refunds and trading stamps. This information is then transmitted for print-out at the printing terminals 150. Data output from the data centre 140 to the store is also recorded in machine language at the data centre and later processed on a non-real time basis to accomplish such tasks as in-	25	1
30	ventory control, automatic recording, store bookkeeping, sales analysis, and price optimization.	30	1
35	Bottle rack display scale 90 and card reader 95 operate in a manner similar to display scales and card readers described but, as customers return bottles to the bottle racks segregated for each type of bottle, net weight increases are detected and credit is given for the bottles returned.	35	1
40	The automatic marketing system of the present embodiment includes certain safeguards against shoplifting and manipulation to avoid payment for articles taken. As previously described, the store control unit 136 detects when no shopper's identification card has been inserted into a card reader 125 and a change in weight has occurred on an associated display scale. The store control unit then actuates instruction light 126, notifying a shopper to insert an identification card into the card reader, and sounds alarm 127 to summon an attendant. Should an identification card be used which is not on a list of cards in use, the store control unit transmits data to identify the display scale associated with the unlisted card relating to a numerical article display directory 137 at the cashier's stand. Then, the cashier notifies an attendant to check on the matter by inspecting the shopper's identification cards in random order to prevent estimating what cards might be in use.	40	1
45	To prevent two shoppers from making purchases with two cards, putting the articles in one basket, and paying the cashier for only one card's charges, it is essential to issue one card to each person entering the store and receive one card from each person leaving the store. Entrance passageway 16 and exit passage 25 are restricted to a width that limits passage to single file past the cashier's chair 24. The cashier can thereby monitor shoppers entering and leaving to see that cards have been properly issued and returned.	45	1
50	A further safeguard would be to provide a scale in the exit passage and weigh each loaded shopping cart to compare the total invoiced weight of articles selected with the weight of articles in the shopping cart. Articles not purchased in the store could be removed from the shopping cart before weighing and if the scale weight of the articles remaining in the cart exceeded the total weight of invoiced items, an attendant could check the articles remaining in the shopping cart.	50	1
55	Data input from the display scales could be analyzed to determine when weight changes occur on the display scales that do not equal exact multiples of the item weights. This would indicate if a rock or less expensive item were being substituted for a more expensive item. In such instances, the foreign object would probably bear finger prints to verify which shopper made the substitution. Further-	55	1
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more, the data input to the computer could be analyzed for suspicious activity such as picking up and returning items. If a high priced article is handled and returned by a customer whose account shows a prior purchase of a low priced article having the same weight, the computer could be programmed to print out a notice for the cashier to have the shopping cart checked to see if the low priced article had been substituted for the high priced article.

Other safeguards might include enclosing the merchandise behind transparent covers which would open upon the insertion of a customer's identification card into an associated card reader and providing television surveillance of the store. Observance by store employees and honest customers would also make dishonest activities more difficult to disguise.

In order to reduce the total number of display scales required to support merchandise in the store, more than one type of article could be displayed on the same display scale if the weights of each type of article displayed are readily distinguishable. The computer storage would contain data on the weights of each type of article displayed and could identify the specific type of article by the change in weight on the display scale.

With the system hereinbefore described there are no time-consuming delays at a checkout stand because it is unnecessary for a shopping cart to be emptied and for a checker to ring up each item selected by the customer.

The customer has free access to handle and inspect articles while making a selection, and may return items to the display self without being charged for them, since it is only the weight differential between the time a customer's card is inserted into a card reader and the time the card is removed from the card reader that is significant in detecting the articles selected.

#### WHAT WE CLAIM IS:—

1. An automatic marketing system comprising a plurality of means for supporting articles of merchandise in self-service sales display positions, weight-sensing means connected to each of said article-support means for translating changes in weight on said article-support means into electrical signals, detecting means associated with said weight-sensing means for receiving customer-identification means and for sensing indicia thereon to identify customers at the time articles are placed on or removed from the associated article-support means, and data-processing equipment connected with said weight-sensing means and said detecting means for recording weight changes produced by article placement or removal by an identified customer and tabulating these data into an invoice.

2. A system according to claim 1, wherein the weight-sensing means has a sensitivity sufficient to determine when a single article has

been removed from a group of similar articles of uniform weight within the load capacity of said article-support means.

3. A system according to claim 1, wherein the weight-sensing means has a sensitivity sufficient to determine the actual weight of an article removed from a group of similar articles of random weight within the load capacity of said article-support means.

4. A system according to any one of the preceding claims, wherein said weight-sensing means include load cells positioned to function as compression members beneath said article-support means.

5. A system according to any one of the preceding claims, wherein said article-support means includes at least one cantilever beam that carries the articles of merchandise supported, and said weight-sensing means includes a strain gauge attached to the cantilever beam.

6. A system according to any one of claims 1 to 4, wherein said article-support means includes a platform for supporting articles of merchandise, said platform having a downwardly-turned peripheral edge, a shelf positioned beneath said platform, said platform being suspended above said shelf by cantilever beams, and said weight-sensing means includes strain gauges attached to the cantilever beams, said downwardly-turned peripheral edge of the platform being spaced above the shelf when no articles are on the platform by a distance equal to a deflection within the elastic limit of the cantilever beams.

7. A system according to any one of the preceding claims, including a dispenser for distributing a said identification means to each customer and indicating to said data processing equipment when each identification means is issued, and a reclaimer for receiving the identification means from each customer upon completion of shopping and signaling said data to processing equipment to prepare an invoice for the customer.

8. A system according to any one of the preceding claims, including an alarm connected with the weight-sensing means and detecting means to indicate when an article of merchandise has been lifted from the article-support means without a customer identification means having been inserted into the detecting means.

9. A system according to claim 7, including signal means for indicating that a counterfeit customer-identification means is in use when said data processing equipment detects an identification means in use without a record of the identification means having been issued.

10. A system according to any one of the preceding claims, including means supporting a bottle rack, second weight-sensing means connected to the bottle rack support means for translating changes in weight into voltage changes, a second detecting means associated with said bottle rack supporting means for re-

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ceiving customer identification means and sensing indicia thereon to identify particular customers, said second weight-sensing means and said second detecting means being connected to said data processing equipment whereby credit is given to a customer's account for bottles inserted into the bottle rack.

11. A system according to any one of the preceding claims, wherein said data processing equipment includes, means for periodically sensing the weights detected by said weight-sensing means and detecting means associated therewith for separate analog signals, means for converting said analog signals into digital machine language, means for comparing signals received on a current sensing sequence of the weights detected by the said weight-sensing means with signals received on a prior sequence to determine the number of articles removed from the article-support means and any customer-identification means associated therewith, means for storing data of articles removed by each identified customer, means for storing price information relative to the articles, means for calculating charges for the number of articles removed by each identified customer and means for printing each customer's invoice.

12. A method of marketing merchandise comprising the steps of displaying like articles for sale in groups acting upon weight-sensitive electric transducers, identifying each customer selecting articles from each group by means bearing indicia, rapidly sensing the reading in sequential order of each weight-sensitive electric transducer and any customer identification means associated therewith, comparing readings received on a current sensing sequence with readings received on a prior sensing sequence to determine the number of articles removed from each group and the identification of customers removing the articles, storing data of articles removed by each identified customer in the memory of a computer, storing price information relative to articles of each group in the memory of the computers, calculating charges for the number of articles removed from each group and the total charge for all articles removed by each identified customer, and printing each customer's invoice in accordance with output data from the computer.

13. A method according to claim 12 wherein more than one group of like articles act upon the same weight-sensitive electric transducer and the articles of each group are readily distinguishable by weight, and identifying the specific article removed by weight changes on the weight-sensitive electric transducer.

14. An automatic marketing system substantially as hereinbefore described with reference to the accompanying drawings.

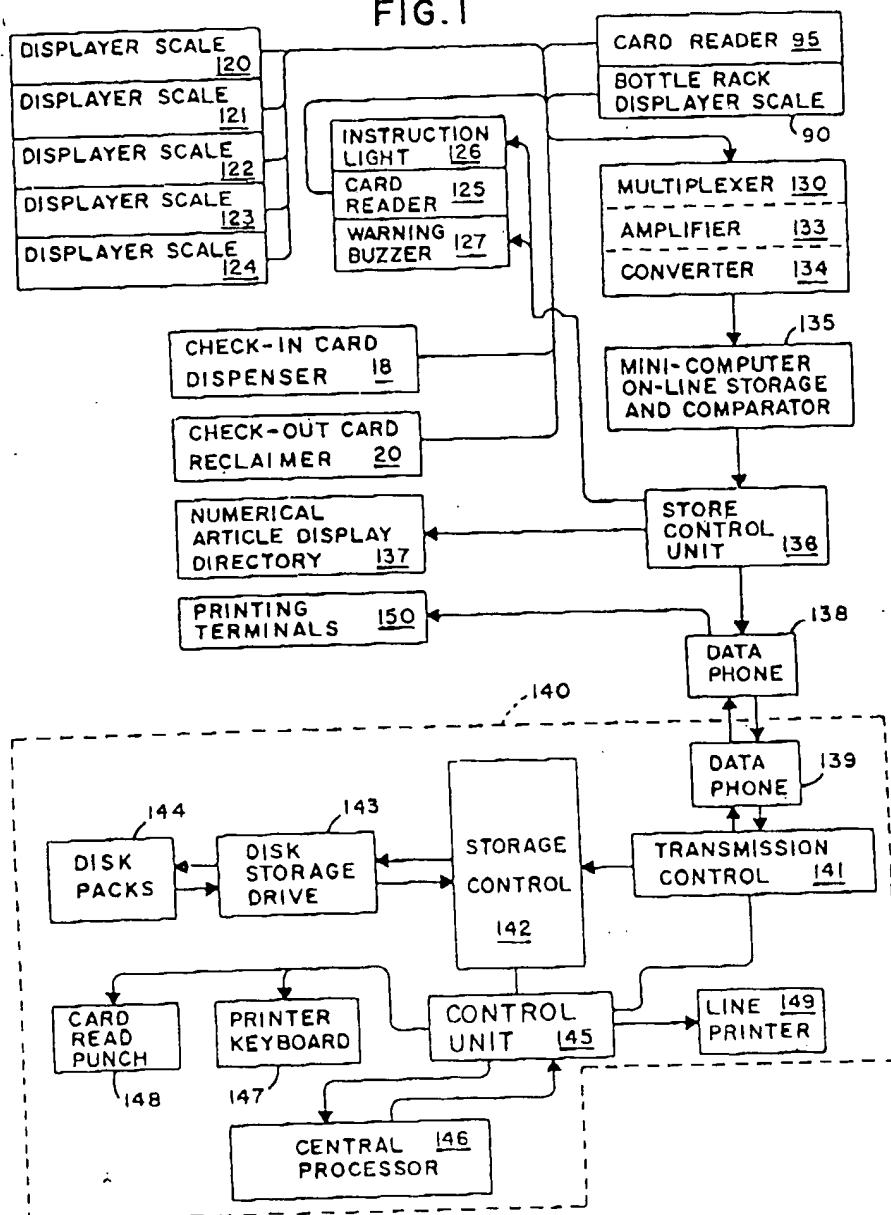
15. An automatic marketing method substantially as hereinbefore described with reference to the accompanying drawings.

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FIG.1



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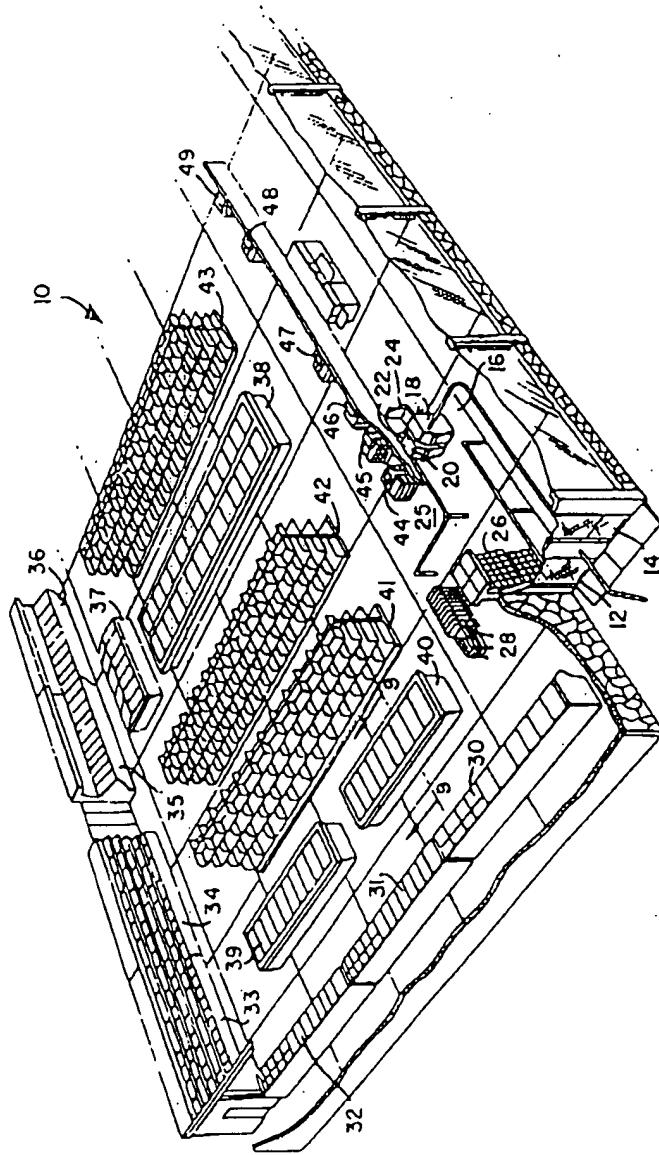


FIG.2

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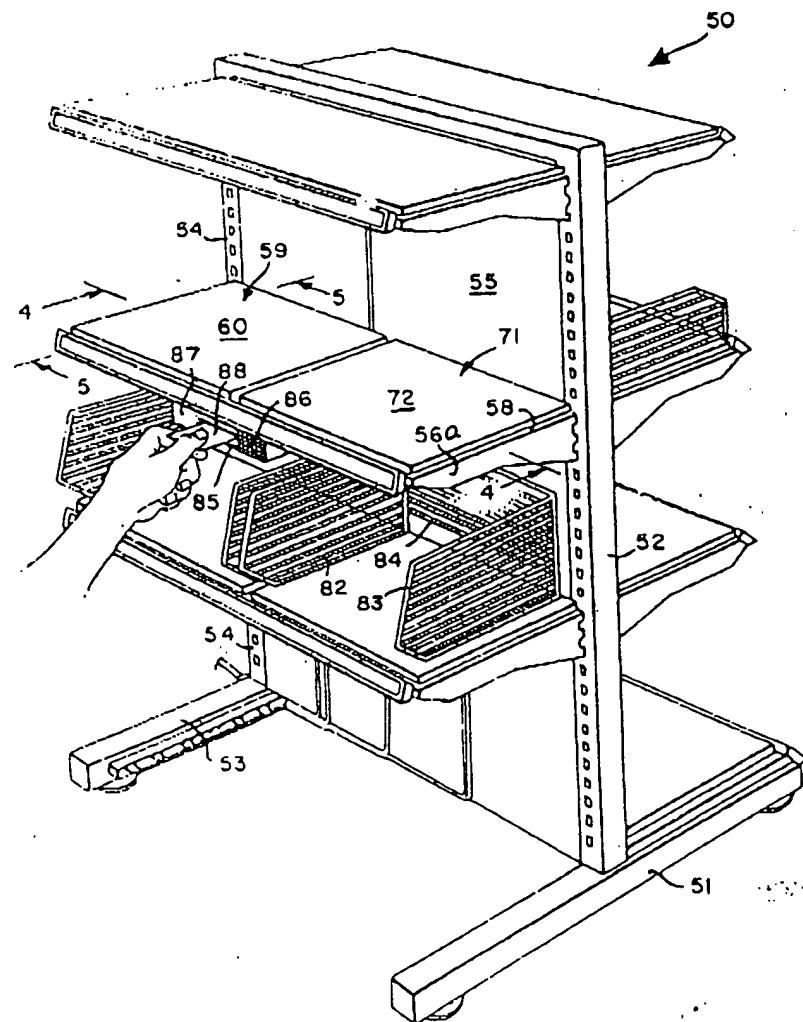


FIG. 3

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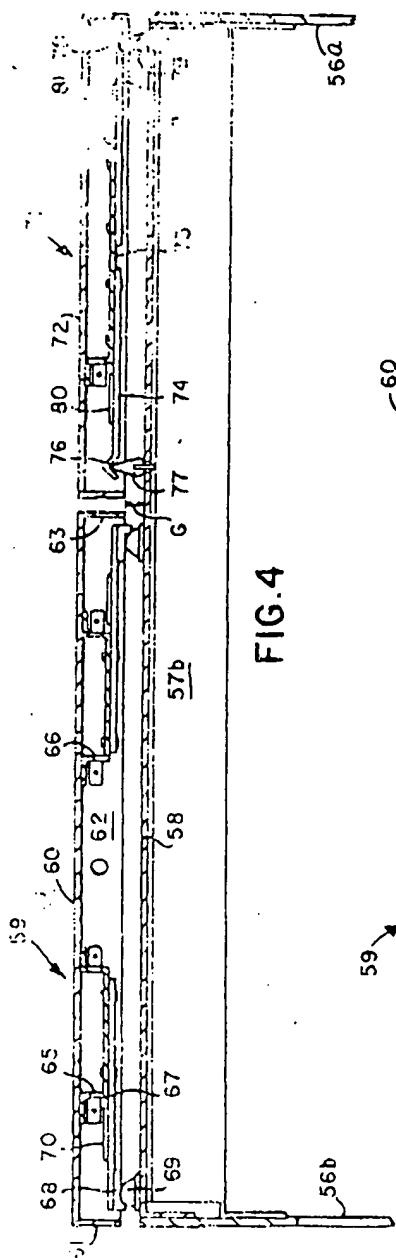


FIG. 4

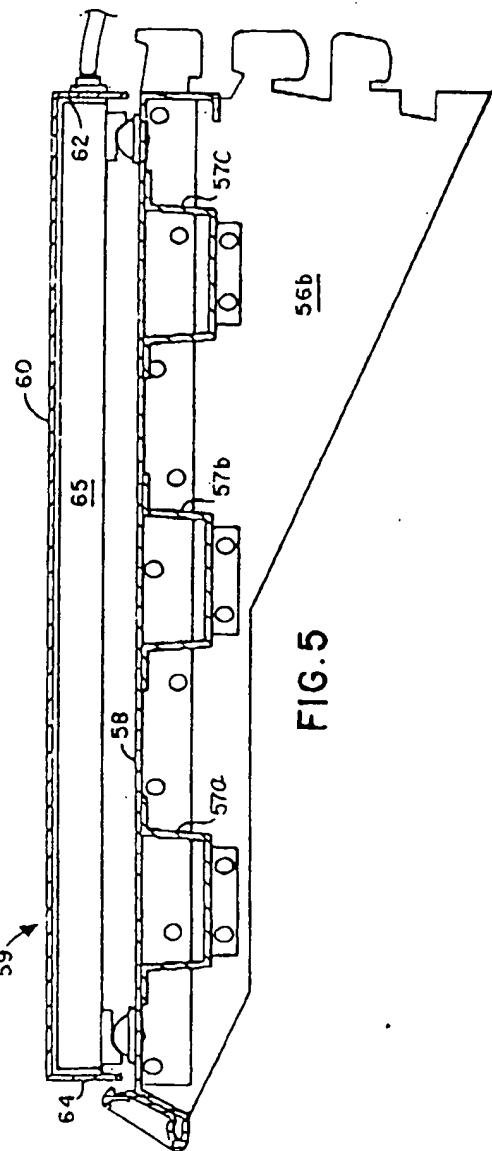
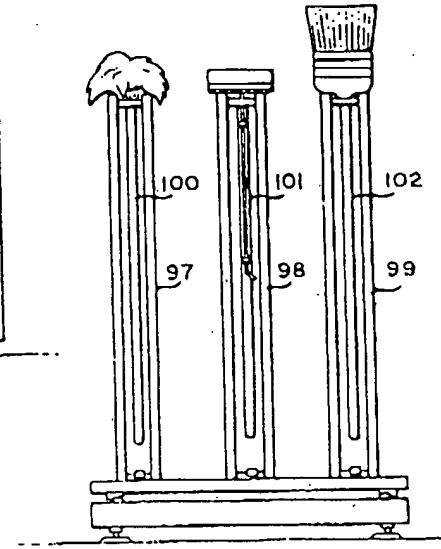
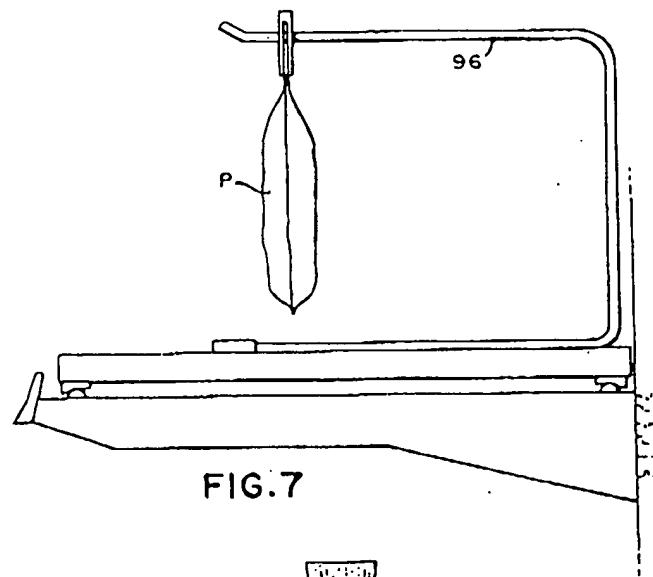
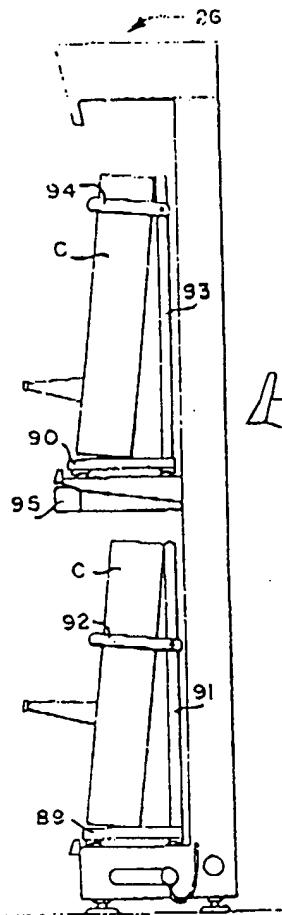


FIG. 5

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Sheet 6

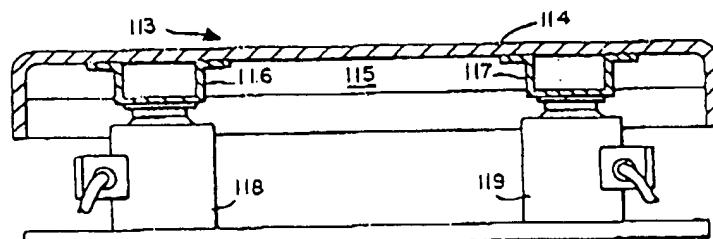


FIG. 11

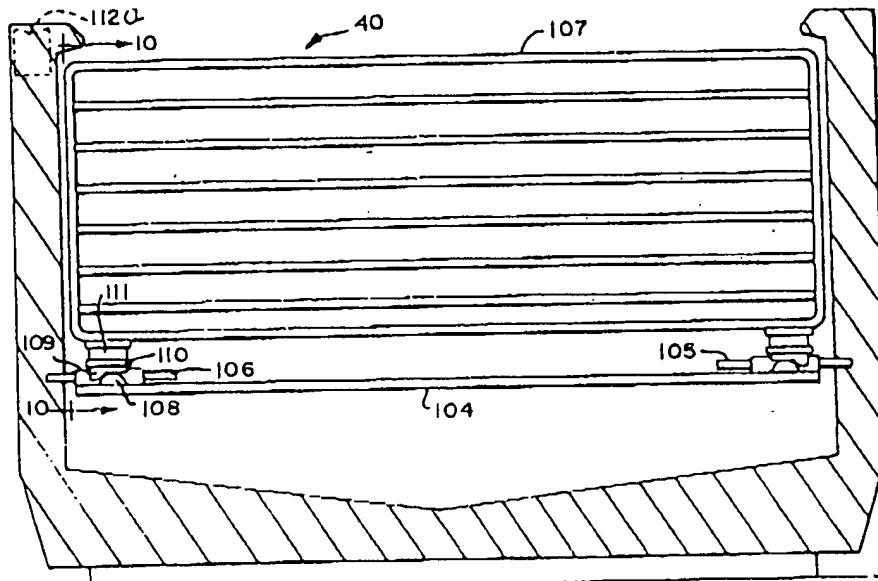


FIG. 9

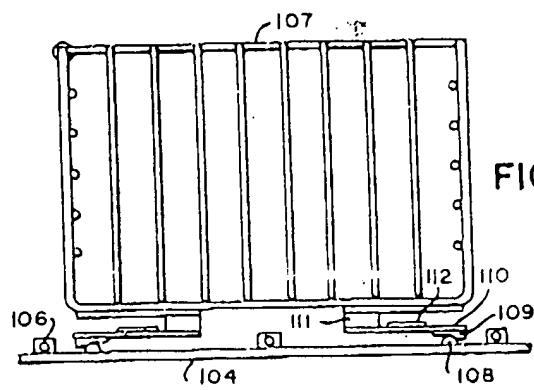


FIG. 10